

# PATENT SPECIFICATION

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455,585

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(Divided out of No. 452,240).

Complete Specification Accepted: Oct. 23, 1936.



## COMPLETE SPECIFICATION

### Improved Means for Varying the Compression Ratio in Internal Combustion Engines of the Swash-plate or Equivalent Type

I, ANTHONY GEORGE MALDON MICHELL, F.R.S., of 4, Bank Place, Melbourne, Australia, a Subject of the King of England, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to internal combustion engines in which the ignition of the fuel is effected by compression of the cylinder contents consisting of air together with some residual gases of combustion, and in which the cylinders are arranged parallel to and circumferentially around the engine shaft, the pistons driving the shaft by a swash-plate or other equivalent means.

It is well known that in compression-ignition engines a higher degree of compression is required to effect self-ignition at starting and when the engine is running on light load than is necessary after the engine has attained full load. When, as is usual, the engine is arranged to work with a fixed ratio of compression, constant for all loads, this ratio must be sufficiently high to ensure ignition at starting, and the design of the engine must therefore provide greater strength, and consequently involves greater weight and cost, than would be necessary if the compression were only sufficient for full-load running. The higher compression also results in rougher and more noisy running.

It is the purpose of the present invention to remove, or at least minimize, these disadvantages of the compression ignition engine by providing automatic means for progressively reducing the compression-pressures as the engine load increases so as to maintain at full load only such a degree of compression as is then necessary to ensure ignition.

According to this invention, a compression-ignition engine having pistons reciprocating parallel to the axis of the engine shaft and driving said shaft by a swash-plate or other equivalent means,

is provided with control mechanism automatically operated by the pressure of the gases in the engine cylinders whereby the pistons and engine shaft are moved longitudinally in unison so as to vary the compression-spaces of the cylinders in direct ratio with the average pressures therein.

The invention is hereafter described with reference to the accompanying drawings, the engine chosen for illustration of the application of the invention being a two-stroke engine of the form described in my Patent Specification No. 452,240, but it is to be understood that the use of the invention is not restricted to this particular form of swash plate engine.

In the accompanying drawings, Fig. 1 is a longitudinal section of the engine.

Figs. 2 and 3 are half transverse sections taken respectively on the lines II—II and III—III of Fig. 1, the other halves of each of these engine-sections being precisely similar to the half which is shown.

The engine shaft 1 is fitted with a slant 2, with the power pistons 3 engage through bridge-members 4, fitted with bearing members 5, 6. On the opposite end of the bridge-members 4 from the power pistons 3, are fitted the air pistons 7, working in air-cylinders 8, which serve for the supply of air to the power cylinders 9, for scavenging and combustion according to the method usual in 2-stroke engines. Scavenge-ports 10 and one or more exhaust valves 11 are provided in each cylinder, these being operated by usual means. In the engine illustrated, auxiliary exhaust ports 12 and exhaust passages 13 are shown, the use of these ports and passages being fully explained in my Patent Specification above mentioned, but not being essential to the present invention.

The engine chosen for illustration has three power cylinders A, B, C, operating in succession in each revolution of the shaft, but the number of cylinders is 100

[Price 1/-]

according to claim 1, a thrust member on the shaft engaging with a thrust-resisting member forming the movable element of a dash-pot and supported in part 5 elastically and part by pressure of a fluid circulated through the engine and the dash-pot, for the purposes set forth.

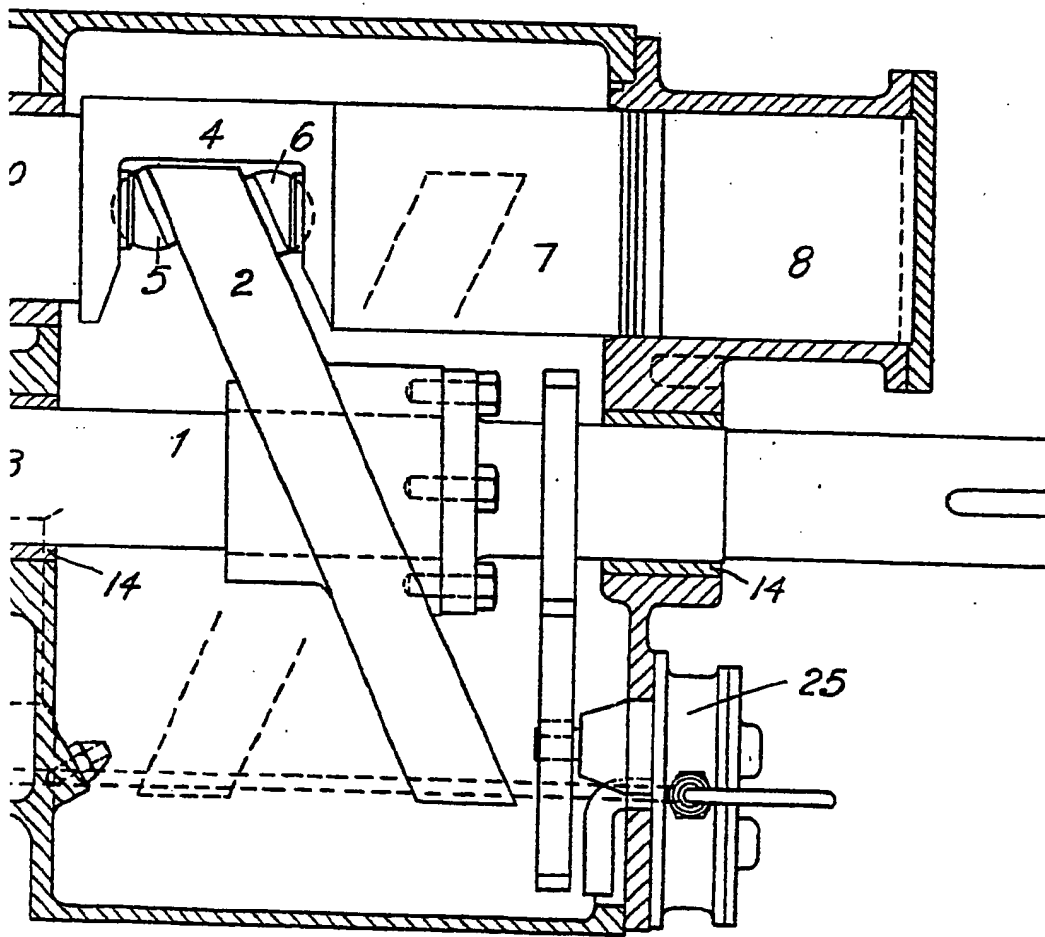
10 (4). In a compression-ignition engine according to claim 1 or claim 2, a thrust-resisting member forming the movable element of a dash-pot and supported in part by springs contained in the dash-pot

and in part by the pressure of a viscous fluid circulated by a pump through the engine, the dash-pot, and a control-valve 15 on an outlet from the dash-pot, for the purposes set forth.

Dated the 22nd day of April, 1936.

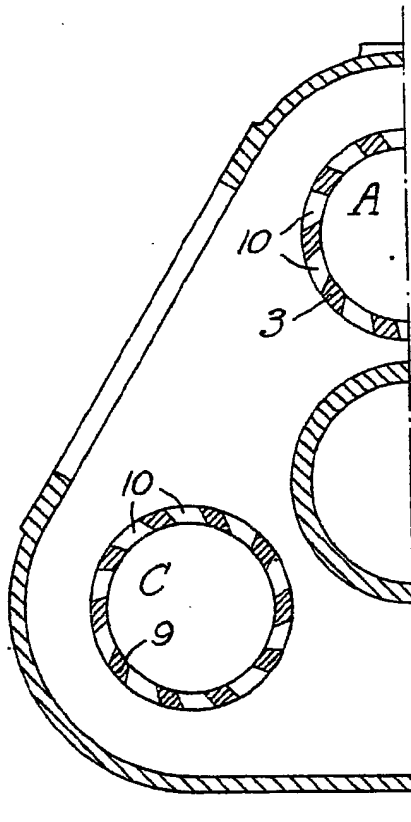
For the Applicant,  
FEENEY & FEENEY,  
Chartered Patent Agents,  
73A, Queen Victoria Street,  
London, E.C.4.

*Fig. 1.*



[This Drawing is a reproduction of the Original on a reduced scale.]

*Fig. 2.*



*Fig. 3.*

